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10010 RECEIVED PCT/PTO 12 DEC 2001

Attorney Docket No. ZIP 2382

Express Mail

Label No: EL888470706

Date of Deposit: 12/21/01

CHAPTER II

TRANSMITTAL LETTER TO THE UNITED STATES ELECTED OFFICE (EO/US)

(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)

PCT/DE00/02081

INTERNATIONAL APPLICATION NO.

23 June 2000 (23.06.00)

INTERNATIONAL FILING DATE

22 June 1999 (22.06.99)

PRIORITY DATE CLAIMED

APPLIANCE FOR DISPENSING SCENTS AND AN AROMA STORE (SCENT CHIP)

TITLE OF INVENTION

Stefan RUETZ (Munich, Germany)
Peter SCHATZ (Karlsfeld, Germany)
Heinz WAGENSONNER (Obersuessbach, Germany)
Gerhard PROBST (Munich, Germany)
Christian BREU (Garching, Germany)

APPLICANT(S)

Box PCT
ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Attention: EO/US

1. This national phase application claims priority of the following national application(s):

German Patent Application No. 199 28 592.6 filed June 22, 1999
German Patent Application No. 100 18 914.8 filed April 17, 2000

2. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 USC 371:

- A. ☒ This express request to immediately begin national examination procedures (35 USC 371(f)).
- B. ☒ The U.S. National Fee (35 USC 371(c)(1) and other fees (37 CFR 1.492) indicated in the attached fee calculation sheet.

3. ☒ A copy of the International application as filed [35 USC 371(c)(2)]:

- a. ☐ is transmitted herewith.

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- b. ☐ is not required as the application was filed with the United States Receiving Office.
- c. ☒ has been transmitted
- i. ☒ by the International Bureau. Date of mailing of the application (from form PCT/IB/308): 28 December 2000 (28.12.00).
- ii. ☐ by applicant on (date) _____.
4. ☒ A translation of the International application into the English language [35 USC 371(c)(2)]:
- a. ☐ is transmitted herewith.
- b. ☐ is not required as the application was filed in English.
- c. ☐ was previously transmitted by applicant on (date) _____.
- d. ☒ will follow (within 32 months of earliest priority date).
5. ☐ Amendments to the claims of the International application under PCT Article 19 [35 USC 371(c)(3)]:
- a. ☐ are transmitted herewith.
- b. ☐ have been transmitted
- i. ☐ by the International Bureau. Date of mailing of the amendment (from form PCT/IB/308): _____.
- ii. ☐ by applicant on (date) _____.
- c. ☐ have not been transmitted as
- i. ☐ applicant chose not to make amendments under PCT Article 19. Date of mailing of Search Report (from form PCT/ISA/210): _____.
- ii. ☐ the time limit for the submission of amendments has not yet expired. The amendments or a statement that amendments have not been made will be transmitted before the expiration of the time limit under PCT Rule 46.1.
6. ☐ A translation of the amendments to the claims under PCT Article 19 [35 USC 371(c)(3)]:
- a. ☐ is transmitted herewith.
- b. ☐ is not required as the amendments were made in the English language.

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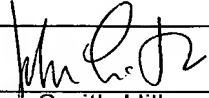
- c. ☐ has not been transmitted for reasons indicated at point 5c above.
7. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409)
- a. ☒ is transmitted herewith.
- b. ☐ is not required as the application was filed with the United States Receiving Office.
8. ☒ Annex(es) to the International Preliminary Examination Report
- a. ☐ is/are transmitted herewith.
- b. ☐ is/are not required as the application was filed with the United States Receiving Office.
- c. ☒ is/are not being transmitted as there is/are no Annex(es).
9. ☒ A translation of the annexes to the International Preliminary Examination Report
- a. ☐ is transmitted herewith.
- b. ☐ is not required as the annexes are in the English language.
- c. ☒ is not being transmitted for the reason indicated at point 8c above.
10. ☒ An oath or declaration of the inventor [35 USC 371(c)(4)] complying with 35 USC 115
- a. ☐ was previously submitted by applicant on (date) _____.
- b. ☒ is submitted herewith and such oath or declaration
- i. ☐ is attached to the application
- ii. ☒ identifies the application and any amendments under PCT Article 19 which were transmitted as stated in points 5a or b; and states that they were reviewed by the inventor as required by 37 CFR 1.70.
- c. ☐ will be provided in response to a Notice to File Missing Requirements.
11. ☒ An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):
- a. ☐ is transmitted herewith.
- b. ☒ has been transmitted by the International Bureau. Date of mailing (from form PCT/IB/308): 28 December 2000 (28.12.00).
- c. ☐ is not required as the application was searched by the United States International Searching Authority.

- d. ☐ will be transmitted promptly upon request.
- e. ☐ has been submitted by applicant on (date) _____.
12. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98:
- a. ☐ is transmitted herewith.
- Also transmitted herewith is
- ☐ Form PTO-1449
- ☐ Copies of citations listed
- b. ☐ will be transmitted within THREE MONTHS of the date of submission of requirements under 35 USC 371(c).
- c. ☐ was previously submitted by applicant on (date) _____.
13. ☒ The applicant claims small entity status with respect to this application.
- ☐ A Verified Statement Claiming Small Entity Status is attached.
- ☒ The undersigned claims small entity status on behalf of the applicant.
14. ☐ An assignment document is transmitted herewith for recording. A separate ☐ "RECORDATION COVER SHEET" is also attached.
-
15. ☒ Additional documents
- a. ☐ Copy of request (PCT/RO/101)
- b. ☒ International Publication No. WO 00/78367
- i. ☐ Specification, claims and drawing
- ii. ☒ Front page only
- c. ☐ Preliminary amendment
- d. ☒ Abstract
- e. ☐ Other
-
16. ☒ The above checked items are being transmitted
- a. ☒ before 30 months from any claimed priority date.

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b. ☐ after 30 months but before 32 months (surcharge and/or processing fee included) from any claimed priority date.

17. ☐ Certain requirements under 35 USC 371 were previously submitted by the applicant on _____, namely:



John Smith-Hill
Reg. No. 27,730

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FEE CALCULATION SHEET

Entry into the National Phase of PCT/DE00/02081

CLAIMS FEE	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
* <input type="checkbox"/>	TOTAL CLAIMS	-20 =		x \$ 18 =	\$
	INDEPENDENT CLAIMS	- 3 =		x \$ 84 =	\$
	MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280 =	\$
BASIC FEE	<input type="checkbox"/> U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO: <input type="checkbox"/> and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(1) to (4) have been satisfied for all the claims presented in the application entering the national state (37 CFR 1.492(a)(4)) \$100 <input type="checkbox"/> and the above requirements are not met (37 CFR 1.492(a)(1)) \$710				
	<input checked="" type="checkbox"/> U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO: <input type="checkbox"/> has been paid (37 CFR 1.492(a)(2)) \$740 <input type="checkbox"/> has not been paid (37 CFR 1.492(a)(3)) \$1,040 <input checked="" type="checkbox"/> where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 CFR 1.492(a)(5)) \$890				890
	OTHER FEES				
	Surcharge of \$130 for furnishing the oath or declaration later than 30 months (but not later than 32 months) from any claimed priority date (37 CFR 1.492(e) and 37 CFR 1.495(c)). <div style="text-align: right;">Total of above Calculations</div>				+ = 890
SMALL ENTITY	Reduction by 1/2 for filing by small entity, if applicable. Affidavit must be filed also. (note 37 CFR 1.9, 1.27, 1.28)				- 445
	Subtotal				445
	Processing fee of \$130 for furnishing the English Translation later than 30 months (but not later than 32 months) from any claimed priority date (37 CFR 1.492(f) and 37 CFR 1.495(c)).				+ 130
	National Fee				\$ 575
	Fee for recording the enclosed assignment document \$40 (37 CFR 1.21(h)).				+
TOTAL	TOTAL FEES ENCLOSED				\$ 575

See attached Preliminary Amendment.

☒ A check in the amount of \$575 to cover the above fees is enclosed.

☒ Please charge any additional basic filing fees under 37 CFR 1.492(a) which may be required by this paper, or credit any overpayment to Deposit Account No. 19-2560. This sheet is filed in duplicate.


Penelope Stockwell

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FEE CALCULATION SHEET
Entry into the National Phase of PCT/DE00/02081

CLAIMS FEE	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
* []	TOTAL CLAIMS	-20 =		x \$ 18 =	\$
	INDEPENDENT CLAIMS	- 3 =		x \$ 84 =	\$
	MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280 =	\$
BASIC FEE	<input type="checkbox"/> U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO: <input type="checkbox"/> and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(1) to (4) have been satisfied for all the claims presented in the application entering the national state (37 CFR 1.492(a)(4)) \$100 <input type="checkbox"/> and the above requirements are not met (37 CFR 1.492(a)(1)) \$710 <input checked="" type="checkbox"/> U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO: <input type="checkbox"/> has been paid (37 CFR 1.492(a)(2)) \$740 <input type="checkbox"/> has not been paid (37 CFR 1.492(a)(3)) \$1,040 <input checked="" type="checkbox"/> where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 CFR 1.492(a)(5)) \$890				890
OTHER FEES	Surcharge of \$130 for furnishing the oath or declaration later than 30 months (but no later than 32 months) from any claimed priority date (37 CFR 1.492(e) and 37 CFR 1.495(c)).				+
	Total of above Calculations				= 890
SMALL ENTITY	Reduction by 1/2 for filing by small entity, if applicable. Affidavit must be filed also. (note 37 CFR 1.9, 1.27, 1.28)				- 445
	Subtotal				445
	Processing fee of \$130 for furnishing the English Translation later than 30 months (but not later than 32 months) from any claimed priority date (37 CFR 1.492(f) and 37 CFR 1.495(c)).				+ 130
	National Fee				\$ 575
	Fee for recording the enclosed assignment document \$40 (37 CFR 1.21(h)).				+
TOTAL	TOTAL FEES ENCLOSED				\$ 575

See attached Preliminary Amendment.

[x] A check in the amount of \$575 to cover the above fees is enclosed.

[x] Please charge any additional basic filing fees under 37 CFR 1.492(a) which may be required by this paper, or credit any overpayment to Deposit Account No. 19-2560. This sheet is filed in duplicate.

Penelope Stockwell
Penelope Stockwell

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Attorney Docket No. ZIP 2382
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Deposit Date 2/7/02 #4/a

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Stefan RUETZ et al

Art Unit:

Application No: 10/019,171

Examiner:

Filed:

For: APPLIANCE FOR DISPENSING SCENTS AND AN
AROMA STORE (SCENT CHIP)

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Please make the following amendments to this application prior to examination thereof.

AMENDMENTS

In the Claims:

Claims 3-35, cancel.

Add new claims as follows:

36. (New) The appliance of claim 1, wherein the discharge unit discharges the controlled scent substances stored in the appliance in sync with the user's respiratory process.

37. (New) The appliance of claim 1, wherein the aroma store is embodied as a microchip that can be controlled by the control unit or as a chip card (scent chip) having scent substance storage locations.

38. (New) The appliance of claim 37, wherein the scent chip having the scent substance storage locations is embodied as a replaceable part.

39. (New) The appliance of claim 38, wherein the scent chip has a carrier in or on which the scent substances are disposed in the form of liquids, gels, gases, or solids.

40. (New) The appliance of claim 38, wherein the scent chip has a carrier with an arrangement of porous substances in or on which the scent substances are attached in the form of liquids, gels, or solid deposits.

41. (New) The appliance of claim 38, wherein the scent chip has a carrier with an arrangement of microtanks that hold the scent substances in liquid, gel, or gaseous form and that are covered by a protective layer.

42. (New) The appliance of claim 39, wherein a reagent is assigned to the scent substance storage locations in order to initiate a reaction, for example an exothermic reaction, under defined conditions.

43. (New) The appliance of claim 37, wherein in the appliance one element that can be controlled by the control unit and that is used to discharge scent substance is assigned to each scent substance storage location.

44. (New) The appliance of claim 43, wherein in the appliance one element that can be controlled by the control unit and that is used to discharge scent substance by thermal and/or electrochemical means is assigned to each scent substance storage location.

45. (New) The appliance of claim 38, wherein the scent chip has a carrier with an arrangement of microtanks that hold the scent substances in liquid, gel, or gaseous form and that are covered by a protective layer, one element that can be controlled by the control unit and that is used to discharge scent substance is assigned to each scent substance storage location, and one element that can be controlled by the control unit and that is used to break open the microtank is assigned to each scent substance storage location.

46. (New) The appliance of claim 39, wherein a reagent is assigned to the scent substance storage locations in order to initiate a reaction, for example an exothermic reaction, under defined conditions, one element that can be controlled by the control unit and that is used to discharge scent substance is assigned to each scent substance storage location, and one element that can be controlled by the control unit and that is used to

establish the defined conditions for the reagent is assigned to each scent substance storage location.

47. (New) The appliance of claims 1, wherein the scent substances are stored in liquid form in an aroma reservoir cartridge, and the discharge unit discharges the stored scent substances by mean of a micrometering pump.

48. (New) The appliance of claim 47, wherein a micrometering pump utilizing piezoelectric actuators is provided.

49. (New) The appliance of claim 47, wherein a micrometering pump utilizing thermal actuators is provided.

50. (New) The appliance of claim 1, wherein the scent substances are stored in liquid or gaseous form in the aroma store, and the discharge unit discharges gaseous aroma concentrate using a piezo valve controller.

51. (New) The appliance of claim 47, wherein the discharge unit has a device for atomizing and/or vaporizing the discharged scent substances.

52. (New) The appliance of claim 51, wherein the discharge unit has a mechanical atomizing nozzle.

53. (New) The appliance of claim 51, wherein the discharge unit is equipped with an ultrasonic atomizing device.

54. (New) The appliance of claim 51, wherein the discharge unit is equipped with an electrostatic atomizing device.

55. (New) The appliance of claim 51, wherein a microheating element for vaporizing the discharged scent substances is assigned to the discharge unit.

56. (New) The appliance of claim 51, wherein a microwave unit for vaporizing the discharged scent substances is assigned to the discharge unit.

57. (New) The appliance of claim 1, wherein a receiving module for external control by means of a signal-generating unit or timer unit is assigned to the control unit.

58. (New) The appliance of claim 1, characterized by a small blower to assist the upward movement of the discharged scent or aroma cloud that occurs due to natural convection (body heat).

59. (New) The appliance of claim 1, characterized by a heater to enhance the discharged scent or aroma cloud.

60. (New) An aroma store (scent chip) used in particular with an appliance to discharge scents as recited in claim 1, characterized by a carrier in or on which the scent substances are disposed in liquid, gel, gaseous or solid form.

61. (New) The aroma store (scent chip) of claim 60, characterized by an arrangement of porous substances in or on which the scent substances are attached in the form of a liquid, gel, or solid deposits.

62. (New) The aroma store (scent chip) of claim 61, characterized by a carrier in the form of a resin/plastic or cardboard sheet having an arrangement of depressions/holes holding the porous substances.

63. (New) The aroma store (scent chip) of claim 62, characterized by a metal or metal vapor-deposited plastic shell that insulates the porous substance from the carrier material.

64. (New) The aroma store (scent chip) of claim 63, characterized by an electrical insulating layer on the underside of the carrier sheet.

65. (New) The aroma store (scent chip) of claim 62, wherein the porous substances are embedded in a silicon on plastic resin compound.

66. (New) The aroma store (scent chip) of claim 61, wherein the scent substance-saturated porous substances are sealed on their upper side, for example by means of a wax.

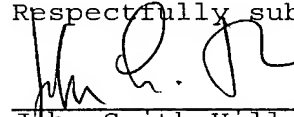
67. (New) The aroma store (scent chip) of claim 60 characterized by an arrangement of microtanks in which the scent substances are held in liquid, gel or gaseous form and by a protective layer that seals the microtanks.

68. (New) The aroma store (scent chip) of claim 60, wherein a reagent is assigned to the arrangement of scent substances to initiate a reaction, for example an exothermic reaction, under defined conditions.

REMARKS

The above amendments are presented in order to place this application in better condition for examination.

Respectfully submitted,



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APPLIANCE FOR DISPENSING SCENTS AND AN
AROMA STORE (SCENT CHIP)

[0001] The invention relates to an appliance for dispensing scents as recited in the preamble of claim 1, as well as an aroma store (scent chip) used in particular with said appliance for dispensing scents.

[0002] EP 0 611 476 B1 discloses a process for heightening the sensory perception of visual and/or acoustic presentations in motion picture theaters, theatrical venues, or in concert halls in which appropriate scents are directed at the audience synchronized with the presentation of certain visual and/or acoustic events or scenes. The scents are transported to the audience using air as the carrier gas. To accomplish this miniaturized individual pipes equipped with air outlets are routed to the seats in the venue, for example in the armrests or in the backrests of the seats in front of the audience member. The supplies of scents are provided in a releasable solid or liquid form, and they are dispensed by coming into contact with a flowing stream of air that is sent to the individual pipes from a source of compressed air. The total emerging air flow that transports the scent and reaches an individual in the audience should be less than 1 l/sec., preferably between 0.3 and 0.00001 l/sec.

[0003] A system such as this to deliver scents to accompany cinematic presentations, musical programs, or theater plays is difficult to implement in the market since it requires expensive installations in the performance halls and since the costs of such investments will not be acceptable until a sufficient number of productions are mounted on the market. Conversely, productions accompanied by the dispensing of scents will not be mounted until there are a sufficient number of halls equipped for this purpose.

[0004] EP 0 732 132 A2, a divisional application from EP 0 611 476 B1, discloses a corresponding scent-supporting system in which air is used as the carrier gas and in which permanent installations utilizing pipes are not used and the scents are supplied to the audience from a mobile unit synchronized with the presentation of various visual and/or

acoustic events or scenes. The mobile unit has a "scent composer" in which the required scent notes are mixed together from basic scent components in scent mixing rolls. A small tangential blower located inside the scent composer generates air that flows through the scent mixing rolls and picks up the specific scents of the basic scent components in order to compose the required scent. The scent composer is intended for use in relatively small rooms for decentralized applications, such as slide presentations or the presentation of video or television programs. The signal line for controlling the mixing rolls could be connected to a video tape player or a television, and control pulses for specific scenes could be sent to the television by means of a radio-frequency signal.

[0005] The object of the invention is to provide an appliance for dispensing scents that can dispense scents that are appropriate for specific events or scenes, and that can be used as an individual appliance without generating installation costs, and that operates with very small amounts of aroma or scent substances and meets acceptable standards of hygiene. The appliance that is to be created should generally be suitable for dispensing individual scents or a sequence of scents. The input for the scent or scents that are to be dispensed should be accomplished manually or through the transmission of a signal, for example over the Internet. The object of the invention is to provide an aroma store (scent chip) that can be mass-produced at an extremely reasonable price and can be used with an appliance for dispensing scents.

[0006] The invention accomplishes this object with an appliance for dispensing scents as characterized in claim 1. Further embodiments of the invention are described in the dependent claims. An aroma store (scent chip) in accordance with the invention is recited in claim 27 and the dependent claims relating thereto.

[0007] The appliance of the invention is characterized by the fact that a carrier gas like air is not used to dispense the scents. Rather, the scents are dispensed directly from an

aroma store, for example by means of a micrometering pump and atomization or volatilization. The scent or aroma cloud produced in this manner rises to the user's nose as a result of the natural convection produced by the user's body heat. Its intensity exceeds the threshold of perception and it thereby provides the desired olfactory stimulus.

[0008] The appliance is worn on the user's body suspended in front of the user's chest like a brooch, or worn like a chain around the user's neck, or it is inserted in the user's outer breast pocket like a ballpoint pen. The appliance can also be positioned in close vicinity to the user by other means, for example in an armrest (or on a hinged arm) of a chair. Only very minimal amounts of scents and fragrances need to be used due to the close proximity with the user's nose. A small blower can be used to assist the upward movement of the cloud of scent or aroma that results from natural convection, and a heater can also be provided. The heater also makes many scents richer and more complex.

[0009] After it has been perceived, the scent/aroma cloud is dispersed as a consequence of mixing with the ambient air. When this happens, the intensity of the scent/aroma cloud quickly falls below the limit of perceptibility. In addition, the phenomenon of olfactory adaptation brings the sensory stimulus to an end. As a result, olfactory experiences that are of precisely defined duration can be created.

[0010] A control unit, which is best equipped with a receiving module that allows it to be controlled from the outside by means of a signal- or pulse-generating unit, allows the desired scents to be dispensed in sync with the respective performance. No complicated installation or retrofitting work is required at the venue where the appliance will be used. All that needs to be installed at the venue is an additional signal unit or timing unit. The appliances themselves have their own independent power supply in the form of a battery or rechargeable battery. The scents and aromas are discharged directly into the ambient air from the stores, without having to pass through shared pipes and nozzles. This eliminates the need for additional cleaning

procedures. The system does not require any compressed air support, so no problems with objectionable noises are encountered. Miniaturization allows the appliance to be worn by the user in the form of a discrete and even attractive accessory, or it can be installed, clamped or clipped on in the immediate vicinity.

[0011] The appliance of the invention is intended both for private and professional use as a new dimension—not only with media applications. Examples of applications are: shopping, relaxation, meditation, video games, television, video, computer simulations, Internet, cinema, stage productions, and exhibits, to name but a few.

[0012] The cloud of scent/aroma, and also the amount of scent that needs to be stored can be kept to a minimum by discharging the scent in such a way that it is synchronized with the user's breathing. The breathing cycle takes about 6-8 seconds. Taking the scent release time and the average time it takes for the scent to flow to the nose into account, the scent is only discharged when it can reach the nose in one breathing cycle. This link to the respiratory process can also be used, for example, to determine when the user is beginning to fall asleep so a "wake-up" scent can be released.

[0013] The invention is described in greater detail below based on the attached drawings. The drawings show:

[0014] Figures 1a and b are a schematic representation of the appliance of the invention in professional use, for example in a motion picture theater, or in private use, for example with television or the Internet;

[0015] Figure 2 is a schematic diagram of the design of an appliance of the invention;

[0016] Figure 3 shows the placement of the appliance of the invention in front of a user's chest;

[0017] Figure 4 is a schematic diagram showing the design of an aroma reservoir cartridge;

[0018] Figure 5 is a schematic diagram showing the design of an aroma store chip with enlarged representations of a storage space;

- a) in the at-rest condition,
- b) upon heating, and
- c) upon discharge of an aroma cloud;

[0019] Figure 6 is a schematic diagram of preferred embodiment of an aroma store (scent chip) using porous substances as the scent carriers

- a) with heating by means of an IR laser,
- b) with heating by means of a resistance heating element,
- c) and d) with isolation of the porous material from the carrier sheet by means of an aluminum shell or an aluminum vapor-deposited plastic shell
- e) embedding of the porous substance in a resin or plastic carrier
- f) embedding of the porous substance in a thermally conductive compound;

[0020] Figure 7 is an enlarged schematic diagram of a micrometering pump that utilizes piezoelectric actuators with a mechanical atomization nozzle;

[0021] Figure 8 is an enlarged schematic diagram of a micrometering pump that utilizes thermal actuators with a microheating element to volatize the discharged scent substances;

[0022] Figure 9 is an enlarged schematic diagram of a micrometering pump that utilizes piezoelectric actuators with an ultrasonic atomization unit;

[0023] Figure 10 is an enlarged schematic diagram of a micrometering pump that utilizes piezoelectric actuators with an electrostatic atomization unit;

[0024] Figure 11 is an enlarged schematic diagram of the discharge of gaseous aroma concentrate with a piezo valve controller;

[0025] Figure 12 is a schematic diagram of the release of scent synchronized with breathing.

[0026] Figures 1a and 1b show the appliance of the invention in professional use, for example, in a motion picture theater or in private use, for example with television or the Internet. The entire system comprises a

stationary transmitting unit and any number of appliances of the invention, each equipped with a receiving module. The transmitting unit is also the timer interface—i.e., the transmitting unit is combined with corresponding presentation devices or timer units. Signals such as time code or similar signals are used to control the scent/aroma sequences. The appliances of the invention can also be used in a stand-alone mode without external control.

[0027] The appliance itself is a mobile system used to create olfactory experiences. As shown in Figure 2, it essentially comprises four different modules: the control unit with receiving module, the power supply (energy storage unit), the aroma store, and the discharge unit for generating and discharging a scent or aroma cloud. The appliance can be miniaturized to roughly the size of a brooch or ballpoint pen, and it can be worn on the user's body as shown in Figure 3.

[0028] The aroma concentrate can be stored in the aroma store in gaseous, liquid, or solid (paste-like) form, or as a gel. The discharge and generation of a scent or aroma cloud is accomplished in various ways without the aid of a carrier gas, depending on how the aroma concentrate is stored—for example, by volatilization by means of microheating elements or laser energy, or by means of a micrometering pump, under valve control, as will be explained further based on the drawings that appear below.

[0029] The key elements of the appliance of the invention are the aroma store and the discharge unit for generating and discharging a scent and aroma cloud.

[0030] As shown in Figure 4, the aroma store can be an aroma reservoir cartridge that stores the required aroma concentrates 2 in many individual chambers 1. The individual chambers 1 can be filled with identical or different aroma concentrates depending on the application. In order to ensure that the aroma concentrate can flow back into the chamber during operation, a vent hole 3 is provided on the top of the individual chamber 1. In addition, within each individual chamber 1 the undesired escape of aroma is prevented by a

protective membrane or film 4. An electronically readable identification code can be provided on the individual chambers of the cartridge to provide information as to the type of scent, concentration, and how it was prepared. The aroma concentrate is released through an outlet hole 5.

[0031] An aroma reservoir cartridge is used in particular to hold aroma concentrates that are in liquid form. If the aromas are held in gaseous form, the individual chambers form pressure chambers, and the vent hole and protective membrane are not used. The outlet hole must be sealed by a rupturable hole or by a control valve.

[0032] An aroma store is preferably provided in the form of a microchip or as a chip card (scent chip) having scent substance storage spaces as shown, for example, in Figure 5. The aromas can be stored in the chip 6 or on a carrier in small microchambers or microtanks 7, or on small storage locations as a liquid, as a solid, as a gel, or also as a gas. Particularly in the case of liquid/gaseous storage or storage as a gel, the aromas or scent substances are protected under a protective layer or film 8. In the appliance, one element that can be controlled by the control unit is assigned to each scent substance storage location, for example in order to discharge the scent substance by thermal and/or electrochemical means. Heating a heating element 9 located under the chamber 7 or the storage location causes the aroma concentrate to vaporize, and the resulting pressure ruptures the protective film 8. The escape of aroma concentrate in the form of droplets can be prevented by a gas-permeable membrane (Gore-Tex®). The vaporization process causes the aroma to be discharged and form a scent or aroma cloud. In particular in the case of the rupturing protective film 8, the aroma storage locations 7 are used only once. In other words, after the storage location is actuated and the aroma is vaporized, the aroma concentrate that was present there is essentially used up. For scents that are used more often, a corresponding number of storage locations must be filled with the same aroma concentrate. In order to increase the intensity of a scent, a plurality of storage locations 7

can be activated simultaneously. The chip or chip card is generally replaced after the end of a presentation.

[0033] A reagent can also be assigned to the scent substance storage locations in order to initiate an exothermic reaction, for example, under defined conditions. In the appliance, one element that can be controlled by the control unit and that creates said defined conditions for the reagent can be assigned to each scent substance storage location.

[0034] Preferred embodiments of a scent chip are shown in Figure 6. These embodiments, which utilize a porous substance (such as zeolite) as the carrier for the liquid, gelatinous, or solid scent substance, release the scent substance by thermal means. On or in an inexpensive scent carrier sheet 20 (for example a resin/plastic film such as PTFE film or cardboard), the porous substance 21 is applied or inserted in small amounts in a checkerboard pattern.

[0035] In the case of Figure 6 a) the scent carrier sheet 20 is perforated, and the porous substance 21 seals the respective top of the perforation hole in the manner of a plug. The lower side of the perforated film 20 is sealed with a thin film 22. The hollow chambers 23 that are formed in this way serve as reservoirs for the various liquid scent substances, which diffuse into the porous substance. In order to prevent the undesired release of scents, the porous substances 21 can be sealed on their top side, for example using a wax. Beneath the scent carrier 20-23 high-power IR lasers 24 (VCSEL) are disposed in a corresponding checkerboard structure on highly thermally conductive Al_2O_3 ceramic. The individual laser units are approximately 0.35 x 0.35 mm in size. The laser units can be controlled individually by means of a circuit produced using screen printing technology.

[0036] In the case of Figure 6 b), the individual porous substance portions 21 are saturated with the various scent substances or are covered with scent substances in the form of solid coatings. Resistors 25 that can be controlled separately from each other in the appliance are produced by

means of screen printing technology beneath the thin scent carrier sheet 20 on a ceramic or steel substrate board. These resistors, which are about 0.5 x 0.5 mm in size, are individually addressed in a checkerboard pattern by means of AgPb leads, and they are heated electrically.

[0037] In Figures 6 c) and d), the porous substances 21 are located in perforation holes in the carrier sheet 20 as shown in Figure 6a. To prevent the scent substances that have been drawn into the porous substance from diffusing into the carrier sheet 20, and to bundle the heating energy, the porous substance is embedded in an aluminum shell 20' (Figure 6c) or in an aluminum vapor-deposited plastic shell 20'' (Figure 6d). In Figure 6c, an electrical separating layer 20''', a layer of coating, for example, is provided facing the lower side of the carrier sheet 20 in order to insulate the electrically conductive aluminum shell 20' electrically from the heating elements 24, 25 disposed beneath it. If the aluminum or plastic shell is sufficiently stable, the carrier sheet 20 is not necessary.

[0038] In Figure 6 e) the porous substance portions are embedded in a resin/plastic carrier 20; and in Figure 6 f), they are embedded in a thermally conductive compound 20''' such as in a silicone adhesive containing Al_2O_3 (bauxite).

[0039] The functional principle is as follows:

[0040] In Figure 6 a), the IR laser diode emits bundled light energy. This is absorbed by the porous substance in the scent carrier system and is converted to heat. This applied thermal energy heats the porous substance containing the scent substance, until the scent substance vaporizes and thereby releases the scent molecules.

[0041] By varying the laser's power and heating time one can dispense a specific quantity of scent substance and discharge scent substances more than once.

[0042] In Figure 6 b), the heating element is heated and then transfers energy in the form of heat into the contacting scent carrier system. This applied thermal energy heats the porous substance containing the scent substance until the scent substance volatilizes and thereby releases scent

molecules. Varying the duration of heating and the heating output allows one to dispense a specific quantity of scent substance and to discharge scent substances more than once.

[0043] The aroma store (scent chip), in particular that shown in Figure 6, can be manufactured very economically as a mass-produced item. It can be miniaturized to a size of about 30 x 40 mm and a thickness of approximately 1 mm, so that it is easily distributed, for example, in event programs. The user then merely needs to insert the appropriate chip into his appliance in order to release scents and, when the appropriate program (or advertising spot) is received, to enjoy the scent experience. For example, 100 to 400 porous substance portions (i.e. scent substance portions) can be disposed, for example, on the described scent chip. Each porous substance portion has an absorption capacity of 0.1-0.3 μ l scent substance for an olfactory sensation lasting about 10 seconds.

[0044] A discharge unit is needed to generate and to discharge the scent or aroma cloud when the scents are stored in liquid form in an aroma reservoir cartridge. A discharge unit of this type can be constructed with the aid of various technologies. The discharge unit essentially comprises two functional modules, namely a pump unit (not required for gaseous storage) and an atomization or vaporization unit. Microheating or piezo elements can be used to implement the pump units. The atomization unit can be made in a conventional manner using a mechanical nozzle, or it can be implemented with the aid of electrostatic or ultrasonic technology. The vaporization unit is implemented with the aid of a microheating unit. The discharge unit is prevented from running dry by the strong capillary forces in the nozzles.

[0045] When the appliance is turned off, the nozzles can be covered mechanically by a cap in order to prevent the slow release of aromas.

[0046] We shall now explain some discharge units used for liquid aroma concentrates based on Figures 7 to 11. For discharging liquid aroma concentrates, Figure 7 shows a micrometering pump based on piezo elements 10. The aroma

concentrate is pumped mechanically by this piezo element 10. When a voltage pulse is applied, the piezo element 10 moves upward suddenly and draws in liquid. Then the piezo elements returns to its original position, thereby pumping the aroma concentrates through a mechanical atomizer nozzle 11.

[0047] Figures 9 and 10 show corresponding micrometering pumps based on a piezo element 10. Instead of a mechanical atomization nozzle 11, Figure 9 shows an ultrasonic atomizer 12 or it indicates an electrostatic atomizer 13. The ultrasonic or electrostatic atomizer utilizes prior-art technologies, so that a more detailed description is not necessary.

[0048] Figure 8 shows the discharge of liquid aroma concentrates by means of a micrometering pump utilizing thermal actuators. When thermal actuators are used, the aroma concentrate is vaporized on microscopic "hot plates" (heating elements). In addition, the thermal actuators serve to pump aroma concentrate back into the system. When the aroma concentrate is selected, attention must be given to ensuring that no residue is left after vaporization.

[0049] At start-up, first heating element 15 near outlet nozzle 15 must be activated in order to vaporize the liquid that is present there and to eject it has an aroma cloud. After the vaporizer is empty, the liquid is pumped back in the feed line by activating heating element 16. After the heating element cools, new aroma concentrate is drawn in as a consequence of the capillary forces. In order to dispense the desired quantity of aroma, the cycle described above can be repeated as many times as desired, as is the case with the embodiment utilizing the piezo elements. The aroma concentrate can be heated by means of resistance heating, inductively, by using microwaves, etc.

[0050] A micrometering pump constructed using thermal actuators can utilize the prior-art principle of the inkjet printer. The bubble of vapor is generated by means of a heating element in the discharge nozzle at a given distance from the nozzle orifice. This bubble pumps a droplet of liquid, in this case the aroma concentrate, into the outside

atmosphere. Here too, the liquid drop may either be atomized or vaporized.

[0051] Figure 11 shows the discharge of gaseous aroma concentrate with a piezo valve controller. The aroma concentrate can be stored under pressure as a gas, or a gaseous aroma concentrate can be briefly generated using a heating element at the outlet of an aroma liquid store. In the resting position, a piezo element 17 closes the discharge opening 18 by means of an appurtenant sealing element 19. When a voltage pulse is applied, the piezo element 17 moves upward suddenly and opens the discharge opening 18, allowing the pressurized aroma concentrate to escape. The amount of aroma can be metered out by applying a plurality of pulses. The aroma cloud can be generated as described above by means of a mechanical atomization nozzle, or by utilizing ultrasonic or electrostatic methods, etc.

[0052] Figure 12 provides a schematic diagram showing how the scent/aroma cloud and thus the amount of scent being stored can be minimized by synchronizing the ejection of the scent with the user's respiratory process. An acceleration sensor 26 together with the filter 27 and evaluation unit 28 are assigned to the scent emitter 29. They analyze the user's current respiration frequency in order to calculate the next inhalation process in advance. Taking the scent release time and the average time that it takes the scent to flow to the nose into account, a wait-and-go signal is sent to the scent emitter 29. In this way, the scent is not released until it is able to reach the nose in a single inhalation operation. This results in the following advantages:

- the amount of scent required to produce an olfactory sensation is decreased by a factor of 3

- the risk that a person sitting next to the user will be exposed to the scent is reduced

- the amount of energy consumed by the scent emitter is reduced

- the respiration analysis can also be used to determine whether the scent has reached the wearer in order to adjust the dosage accordingly.

What is claimed is:

1. An appliance for dispensing scents having an aroma store, a control unit for controlling the aroma store, and a discharge unit for generating and discharging a scent/aroma cloud from the aroma store, wherein the appliance is embodied as a miniaturized mobile unit to be worn on the body or to be disposed in close vicinity to the user, and the discharge unit discharges the controlled scent substances stored in the appliance by means of direct discharge—in other words, without the assistance of a carrier gas.

2. The appliance of claim 1, wherein the discharge unit discharges the controlled scent substances stored in the appliance directly into the ambient air—in other words without exposing appliance components thereto.

3. The appliance of claim 1 or 2, wherein the discharge unit discharges the controlled scent substances stored in the appliance in sync with the user's respiratory process.

4. The appliance of one of claims 1 to 3, wherein the aroma store is embodied as a microchip that can be controlled by the control unit or as a chip card (scent chip) having scent substance storage locations.

5. The appliance of claim 4, wherein the scent chip having the scent substance storage locations is embodied as a replaceable part.

6. The appliance of claim 5, wherein the scent chip has a carrier in or on which the scent substances are disposed in the form of liquids, gels, gases, or solids.

7. The appliance of claim 5, wherein the scent chip has a carrier with an arrangement of porous substances in or on which the scent substances are attached in the form of liquids, gels, or solid deposits.

8. The appliance of claim 5, wherein the scent chip has a carrier with an arrangement of microtanks that hold the scent substances in liquid, gel, or gaseous form and that are covered by a protective layer.

9. The appliance of claims 6 to 8, wherein a reagent is assigned to the scent substance storage locations in order to initiate a reaction, for example an exothermic reaction, under defined conditions.

10. The appliance of one of claims 4 to 9, wherein in the appliance one element that can be controlled by the control unit and that is used to discharge scent substance is assigned to each scent substance storage location.

11. The appliance of claim 10, wherein in the appliance one element that can be controlled by the control unit and that is used to discharge scent substance by thermal and/or electrochemical means is assigned to each scent substance storage location.

12. The appliance of claim 10 in combination with claim 8, wherein in the appliance one element that can be controlled by the control unit and that is used to break open the microtank is assigned to each scent substance storage location.

13. The appliance of claim 10 in combination with claim 9, wherein in the appliance one element that can be controlled by the control unit and that is used to establish the defined conditions for the reagent is assigned to each scent substance storage location.

14. The appliance of one of claims 1-3, wherein the scent substances are stored in liquid form in an aroma reservoir cartridge, and the discharge unit discharges the stored scent substances by mean of a micrometering pump.

15. The appliance of claim 14, wherein a micrometering pump utilizing piezoelectric actuators is provided.

16. The appliance of claim 14, wherein a micrometering pump utilizing thermal actuators is provided.

17. The appliance of one of claims 1-3, wherein the scent substances are stored in liquid or gaseous form in the aroma store, and the discharge unit discharges gaseous aroma concentrate using a piezo valve controller.

18. The appliance of one of claims 14-17, wherein the discharge unit has a device for atomizing and/or vaporizing the discharged scent substances.

19. The appliance of claim 18, wherein the discharge unit has a mechanical atomizing nozzle.

20. The appliance of claim 18, wherein the discharge unit is equipped with an ultrasonic atomizing device.

21. The appliance of claim 18, wherein the discharge unit is equipped with an electrostatic atomizing device.

22. The appliance of claim 18, wherein a microheating element for vaporizing the discharged scent substances is assigned to the discharge unit.

23. The appliance of claim 18, wherein a microwave unit for vaporizing the discharged scent substances is assigned to the discharge unit.

24. The appliance of one of the above claims, wherein a receiving module for external control by means of a signal-generating unit or timer unit is assigned to the control unit.

25. The appliance of one of the above claims,

characterized by a small blower to assist the upward movement of the discharged scent or aroma cloud that occurs due to natural convention (body heat).

26. The appliance of one of the above claims, characterized by a heater to enhance the discharged scent or aroma cloud.

27. An aroma store (scent chip) used in particular with an appliance to discharge scents as recited in one of claims 1 to 13, characterized by a carrier (20) in or on which the scent substances are disposed in liquid, gel, gaseous or solid form.

28. The aroma store (scent chip) of claim 27, characterized by an arrangement of porous substances (21) in or on which the scent substances are attached in the form of a liquid, gel, or solid deposits.

29. The aroma store (scent chip) of claim 28, characterized by a carrier (20) in the form of a resin/plastic or cardboard sheet having an arrangement of depressions/holes holding the porous substances (21).

30. The aroma store (scent chip) of claim 29, characterized by a metal or metal vapor-deposited plastic shell (20', 20'') that insulates the porous substance (21) from the carrier material (20).

31. The aroma store (scent chip) of claim 30, characterized by an electrical insulating layer on the underside of the carrier sheet (20).

32. The aroma store (scent chip) of claim 29, wherein the porous substances are embedded in a silicon on plastic resin compound.

33. The aroma store (scent chip) of one of claims 28 to

32, wherein the scent substance-saturated porous substances (21) are sealed on their upper side, for example by means of a wax.

34. The aroma store (scent chip) of claim 27 characterized by an arrangement of microtanks in which the scent substances are held in liquid, gel or gaseous form and by a protective layer that seals the microtanks.

35. The aroma store (scent chip) of one of claims 27 to 34, wherein a reagent is assigned to the arrangement of scent substances to initiate a reaction, for example an exothermic reaction, under defined conditions.

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(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG(19) Weltorganisation für geistiges Eigentum
Internationales Büro

INTERNATIONAL PATENT COOPERATION TREATY

(43) Internationales Veröffentlichungsdatum
28. Dezember 2000 (28.12.2000)

PCT

(10) Internationale Veröffentlichungsnummer
WO 00/78367 A1(51) Internationale Patentklassifikation: A61L 9/12,
A63J 23/02, A44C 15/00(71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von
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(21) Internationales Aktezeichen: PCT/DE00/02081

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(25) Einreichungssprache: Deutsch

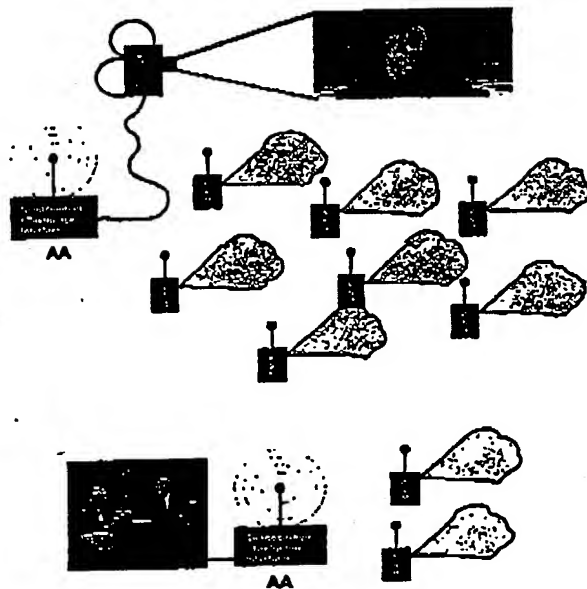
(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität:
199 28 592.6 22. Juni 1999 (22.06.1999) DE
100 18 914.8 17. April 2000 (17.04.2000) DE(74) Anwalt: ZIPSE & HABERSACK; Wotanstrasse 64,
D-80639 München (DE).

[Fortsetzung auf der nächsten Seite]

(54) Title: APPLIANCE FOR DISPENSING SCENTS AND AN AROMA STORE (SCENT CHIP)

(54) Bezeichnung: GERÄT ZUR ABGABE VON DÜFTEN UND AROMENSPEICHER (DUFTCHIP)



AA ... TRANSMITTING UNIT/ CLOCK GENERATOR INTERFACE

(57) Abstract: The invention relates to an appliance for dispensing scents comprising an aroma store, a control unit with a receiving module for controlling the aroma store and comprising a discharge unit for generating and for discharging a scent or an aroma cloud from the aroma store. The appliance is configured as a miniaturized mobile unit to be worn on the body or to be placed in close proximity to the user. The discharge unit discharges the controlled scents stored in the appliance by means of direct discharge, i.e. without the aid of a carrier gas.

(57) Zusammenfassung: Gerät zur Abgabe von Düften mit einem Aromenspeicher, einer Steuereinheit mit Empfangsmodul zur Ansteuerung des Aromenspeichers und mit einer Austrageinheit zur Generierung und zum Austragen einer Duft- bzw. Aromenwolke aus dem Aromenspeicher. Das Gerät ist als eine miniaturisierte mobile Einheit zum Tragen am Körper bzw. zur Anordnung in großer Nähe des Nutzers ausgebildet. Die Austrageinheit trägt die angesteuerten, in dem Gerät gespeicherten Duftstoffe durch unmittelbaren Austrag, d. h. ohne Zuhilfenahme eines Trägergases aus.

WO 00/78367 A1

FIG. 1
a)

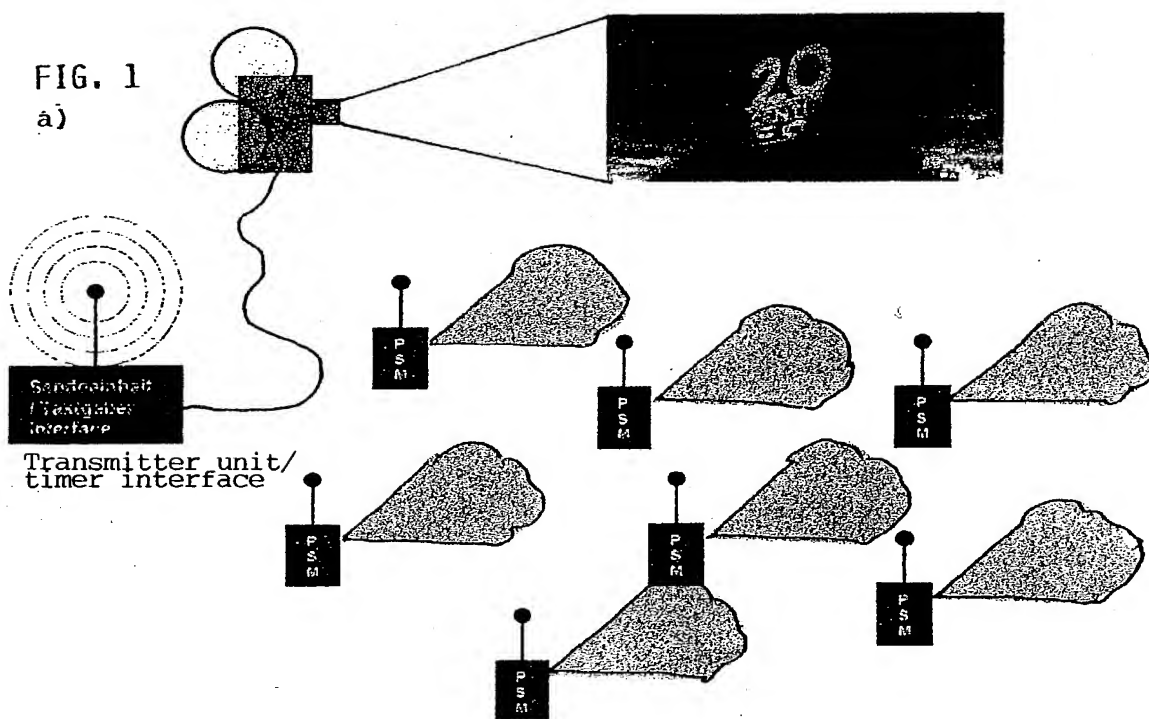
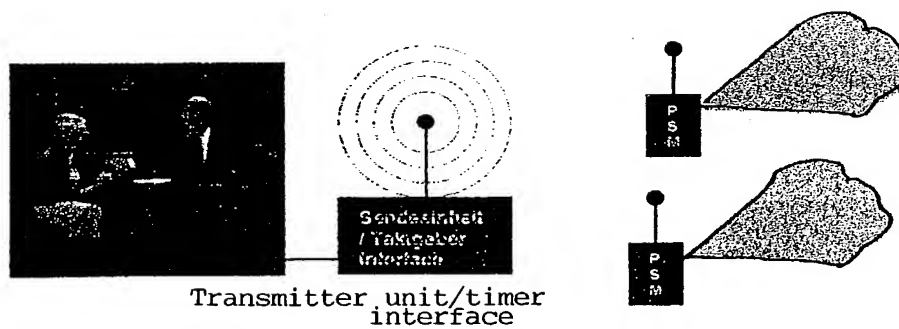


FIG. 1
b)



2/11

FIG. 2

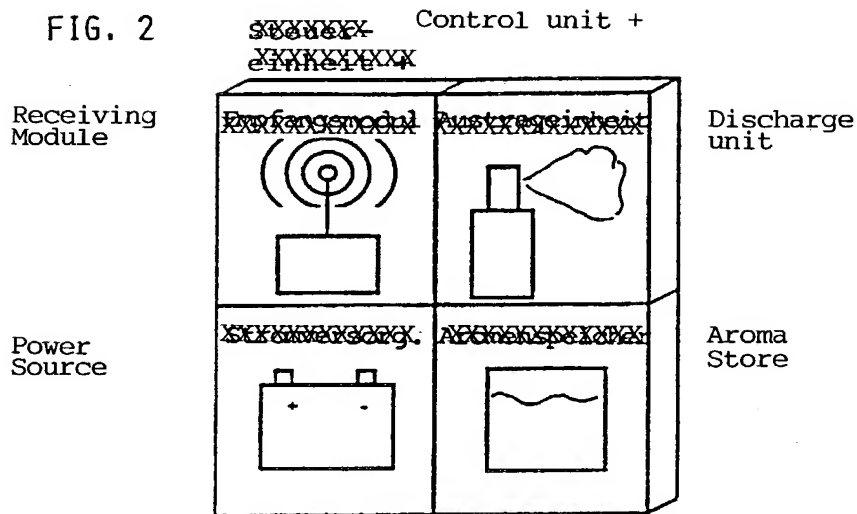


FIG. 3

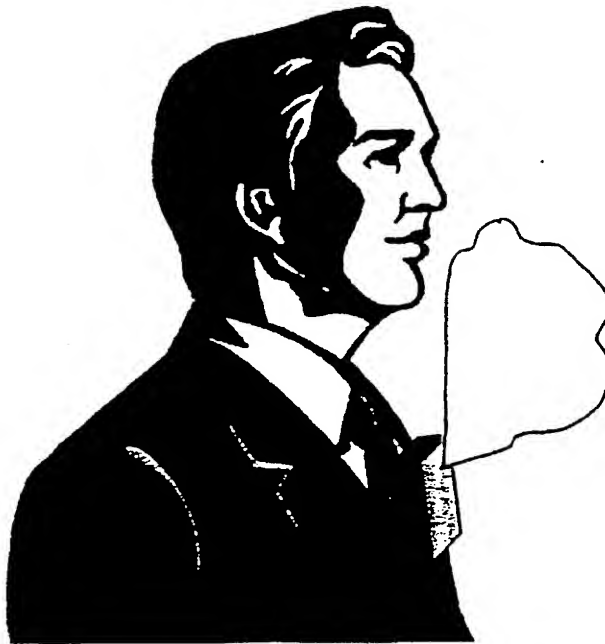


FIG. 4

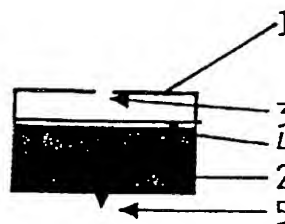
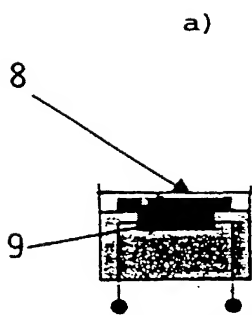
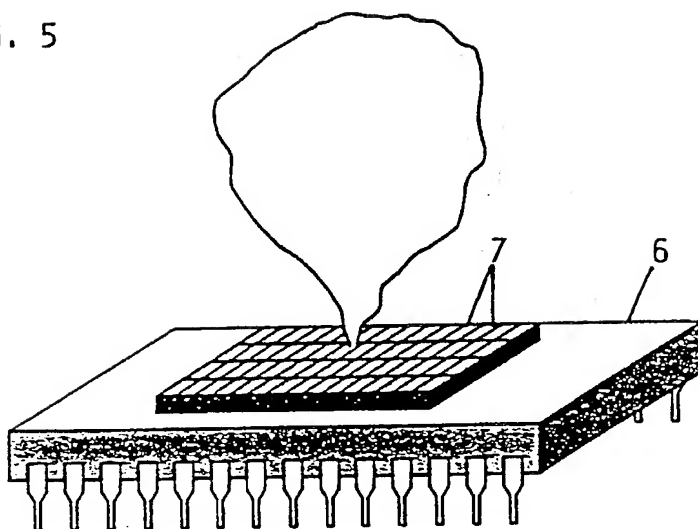
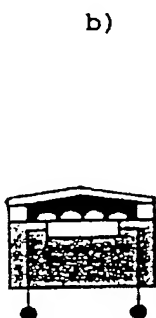


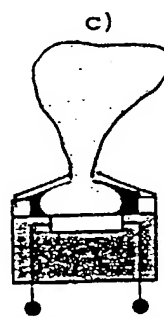
FIG. 5



~~Ruhezustand~~
Resting state



~~Aufheizen~~
Heating

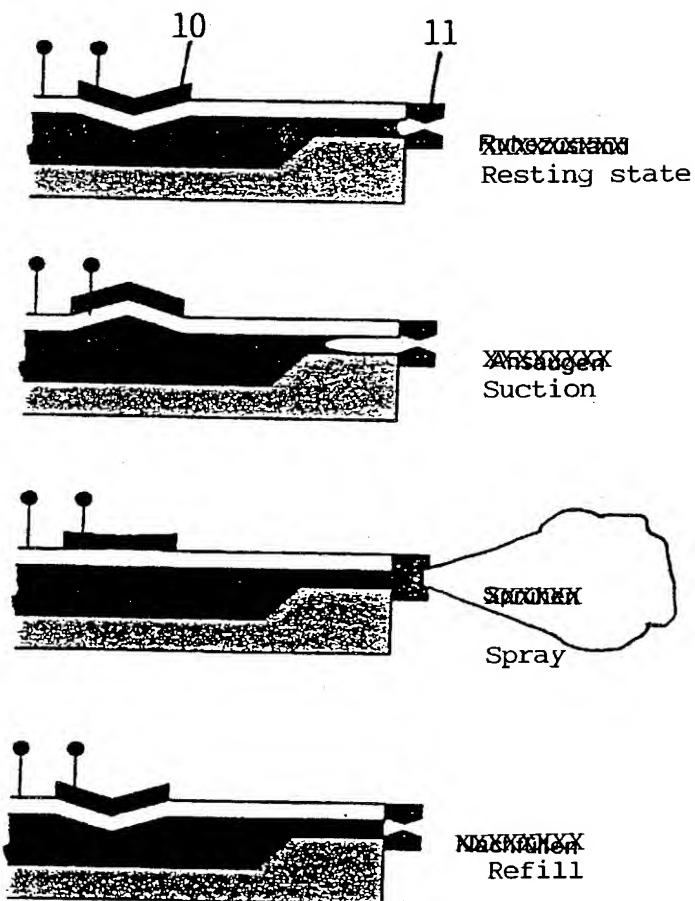


~~Aufplatzen der
Membran und
Ausblasen der
Aromawolke~~

Rupture of membrane
and discharge of
aroma cloud

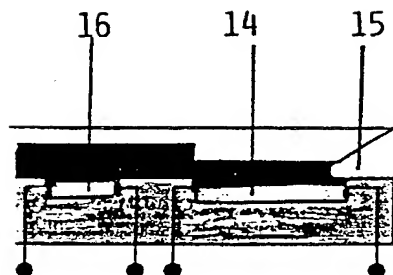
6/11

FIG. 7

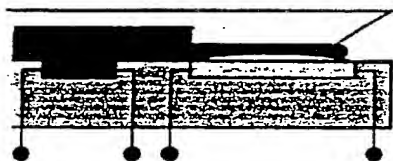


7/11

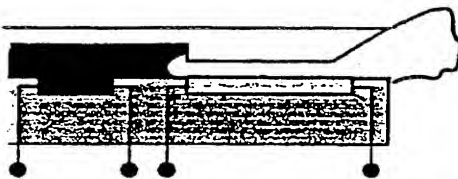
FIG. 8



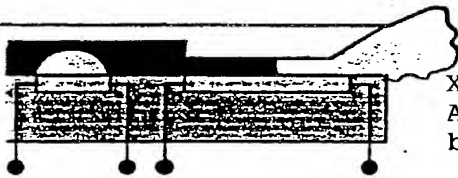
~~Ruhezustand~~
Resting condition



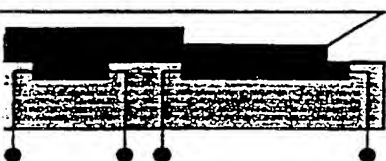
~~Aktivierung des Verdampfers~~
Activation of
vaporizer



~~Beginn Dampfausstoß~~
Begin vapor ejection



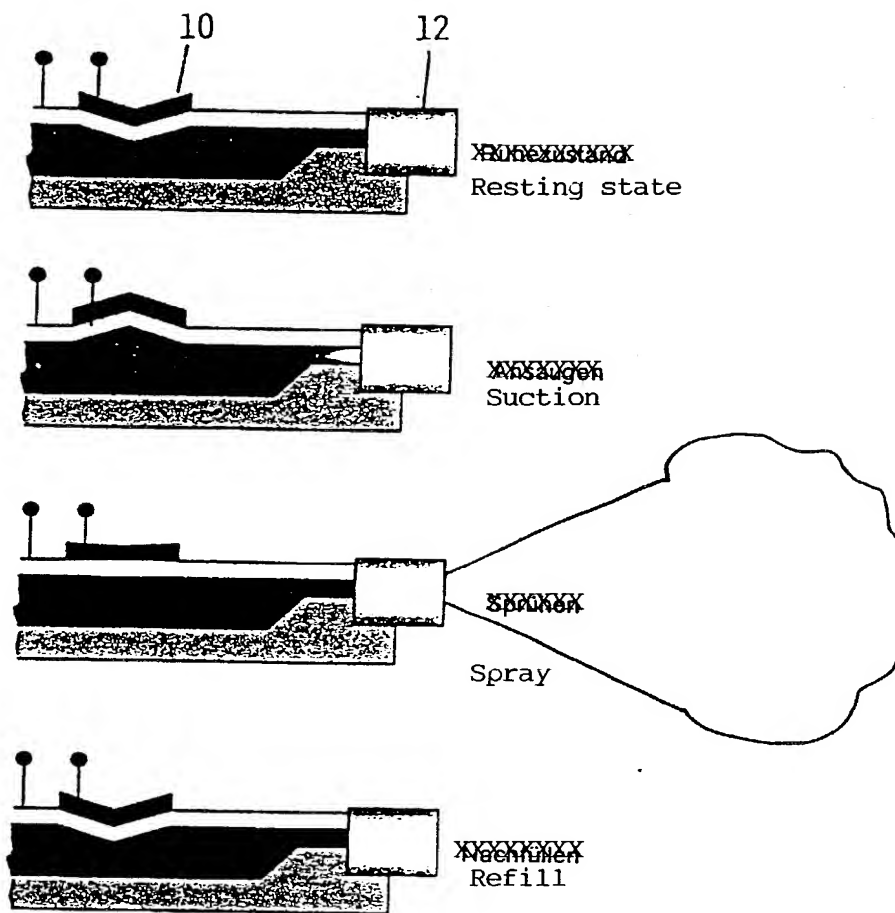
~~Wiederanfüllen von Aromakonzentrat~~
Aroma concentrate pumped
back in



~~Kapillare Wiederauffüllung~~
Capillary refilling

8/11

FIG. 9



9/11

FIG. 10

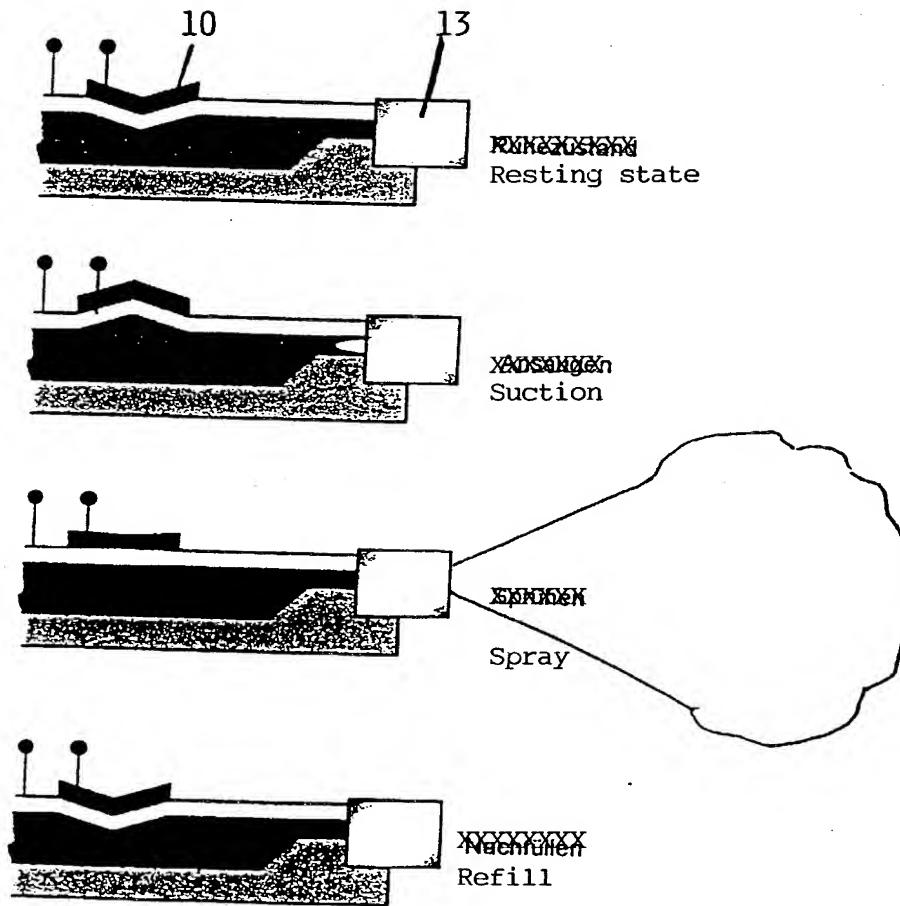
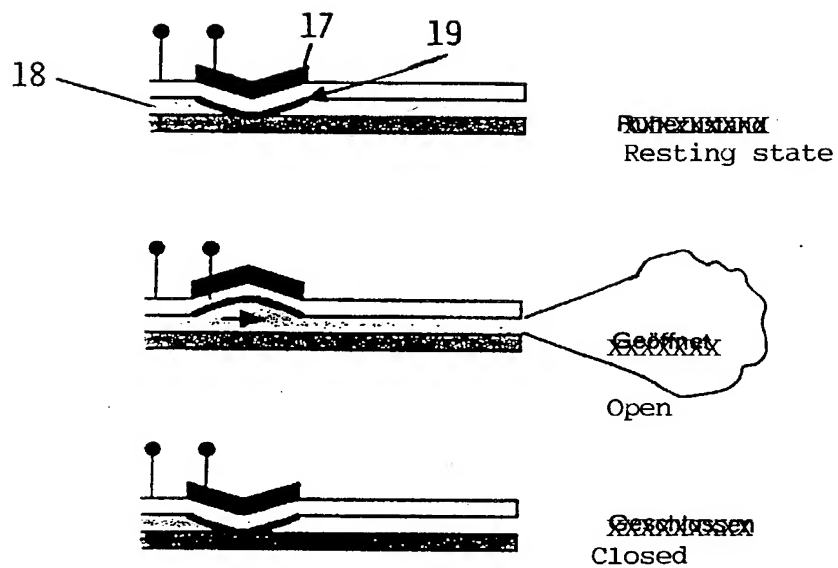
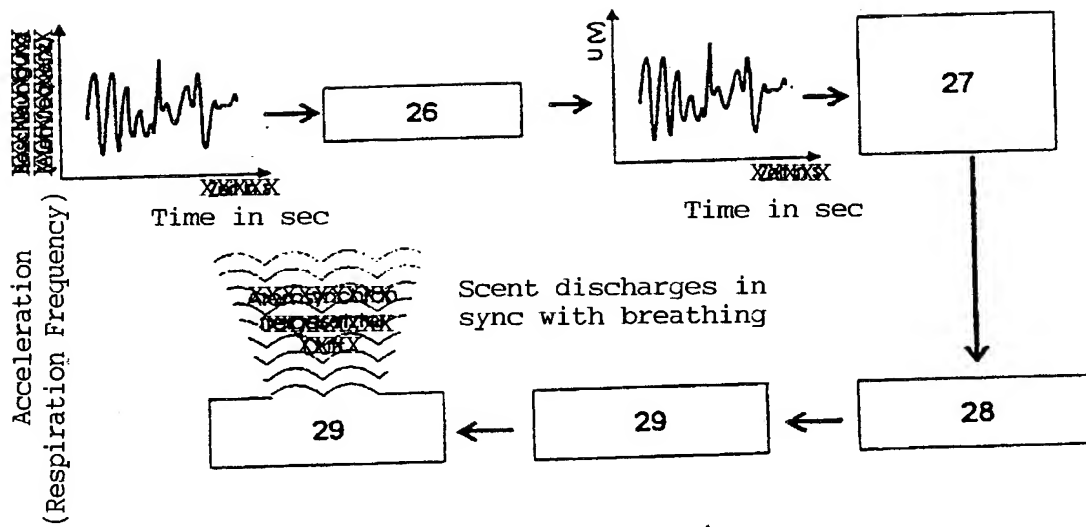


FIG. 11



11/11

FIG. 12



10019171 100102

Attorney's Docket No. ZIP 2382

DECLARATION FOR PATENT APPLICATION
(COMBINED WITH POWER OF ATTORNEY)
(ORIGINAL APPLICATION)

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

APPLIANCE FOR DISPENSING SCENTS
AND AN AROMA STORE (SCENT CHIP)

the specification of which is attached hereto unless box (a) or (b) is checked, in which case

- (a) ☐ the specification was filed on _____ as Application No. _____.
- (b) ☒ the specification was filed as PCT International Application No. PCT/DE00/02081 filed on 23 June 2000 and was amended under PCT Art. 19 on _____ (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Sec. 1.56.

I have identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America and filed less than 12 months (6 months for designs) prior to this United States application and of which I claim foreign priority benefits under Title 35, United States Code, Sec. 119, and I have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

10019171.100102

EARLIEST FOREIGN APPLICATION, AND ALL FOREIGN
APPLICATIONS FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN)
PRIOR TO THIS U.S. APPLICATION

<u>Country</u>	<u>Application No.</u>	<u>Date of Filing</u> (MM/DD/YY)
Germany	199 28 592.6	06/22/1999
Germany	100 18 914.8	04/17/2000

As a named inventor, I hereby appoint the practitioners associated with Customer Number 007812 (John Smith-Hill, Reg. No. 27,730 and Daniel J. Bedell, Reg. No. 30,156) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent.

Send correspondence to the correspondence address associated with Customer Number 007812.

I am signing this power of attorney in order that the Patent and Trademark Office will correspond with the practitioners identified in the power of attorney in proceedings before the Patent and Trademark Office, and I do not intend that the power of attorney in itself create an attorney/client or other fiduciary relationship with Smith-Hill and Bedell, P.C. or any of the identified practitioners.

I hereby authorize the practitioners that I have appointed to accept instructions regarding this application and the resulting patent from ZIPSE & HABERSACK.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Title 18, United States Code, Sec. 1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

10019171.100102

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